

Mapping a Tropical Marine Environment using a Vessel-borne Mobile Laser Scanning System: A Pilot Study

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SUMMARY

Researchers from the Centre of Excellence in Remote Sensing and Spatial Informatics at Xiamen University carried out a pilot study to investigate the marine use of a mobile laser scanning (MLS) systems and a terrestrial laser scanner (TLS) to collect high-resolution near-shore infrastructure and coastal topographic data along the Gulangyu Island, in Xiamen, Southeast China in support of Coastal and Marine Spatial Planning. Investigations into use of a RIEGL VMX-450 MLS system and a RIEGL VZ-1000 TLS full-waveform scanner onboard a small vessel were carried out in Xiamen's tropical marine environment in April 2012 and May 2013, respectively. The high speed of data acquisition, the abundance of information (3D coordinates, reflecting characteristics) and the accuracy of the acquired point clouds within the centimetre range offer good requirements for the use of this new technology for many applications at and on the water. The VMX-450 MLS system consists of two RIEGL VQ-450 scanners (with a scanning range up to 800 m) and four digital cameras for acquisition of point clouds and colour images as well as two GNSS antennas and one inertial measurement unit (IMU) for providing accurate timing for synchronization of laser scanning data along with the real-time position and orientation of the vessel. By integrating RIEGL VZ-1000 into the VMX-450, the system is able to produce a more detailed description of vegetated structures with its full-waveform function and long range up to 1400 m. The investigations demonstrated that the software for data acquisition plays a crucial key role for making the integration of a TLS such as VZ-1000 in real-time successfully accomplished. In addition, the pilot study showed that the pure accuracy of the inertial measurement unit significantly affects the accuracy and quality of the kinematic laser scanning data. Finally, the laser scanner RIEGL VZ-1000 used onboard the vessel has a clear advantage due to its technical specifications concerning scanning range, accuracy and resolution, making the use of this TLS scanner very reasonable economically. By system integration and extension of a TLS scanner on board a vessel the range of applications can be increased.